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CLAIMS

[Claim(s)]
[Claim 1] Input an IF signal or a RF signal, and an office wave, and the RF signal of the sum with an office wave twice the frequency of said and said IF signal and the frequency of a difference is outputted. Or it sets to the even harmonic mixer which outputs the IF signal of the frequency of a difference twice the frequency [said RF signal and] of said office wave. The 180-degree distributor which IF terminal is connected at the middle point of an output side, and distributes said inputted office wave to opposition, The 1st low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 2nd low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 1st antiparallel diode pair which was connected to said 1st low pass filter, and connected diode to reverse juxtaposition, The 2nd antiparallel diode pair which was connected to said 2nd low pass filter, and connected diode to reverse juxtaposition, IF short circuit which it connects [short circuit] at the node of said 1st and 2nd antiparallel diode pairs, and short-circuits an IF signal, The even harmonic mixer characterized by having the high pass filter which is connected at the node of said 1st and 2nd antiparallel diode pairs, is made to pass a RF signal, and intercepts an office wave.
[Claim 2] Input an IF signal or a RF signal, and an office wave, and the RF signal of the sum with an office wave twice the frequency of said and said IF signal and the frequency of a difference is outputted. Or it sets to the even harmonic mixer which outputs the IF signal of the frequency of a difference twice the frequency [said RF signal and] of said office wave. The 180-degree distributor which the middle point of an output side connects too hastily, and distributes said inputted office wave to opposition, The 1st low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 2nd low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 1st antiparallel diode pair which was connected to said 1st low pass filter, and connected diode to reverse juxtaposition, The 2nd antiparallel diode pair which was connected to said 2nd low pass filter, and connected diode to reverse juxtaposition, The inductor which is connected between the node of said 1st and 2nd antiparallel diode pairs, and IF terminal, is made to pass an IF signal, and intercepts an office wave and a RF signal, The even harmonic mixer characterized by having the high pass filter which is connected at the node of said 1st and 2nd antiparallel diode pairs, is made to pass a RF signal, and intercepts an office wave.
[Claim 3] The even harmonic mixer according to claim 1 characterized by transposing to the 1st and 2nd ring diodes instead of said 1st and 2nd antiparallel diode pairs.
[Claim 4] The even harmonic mixer according to claim 2 characterized by transposing to the 1st and 2nd ring diodes instead of said 1st and 2nd antiparallel diode pairs.
[Claim 5] Said 180-degree distributor is an even harmonic mixer given in either from claim 1 characterized by having the conversion function of an I/O impedance to claim 4.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention is used for the radio communications system of microwave and a millimeter wave band, and the transmitter-receiver of a radar system, and relates to the even harmonic mixer which attained miniaturization and broadband-ization.
[0002]
[Description of the Prior Art] It explains referring to a drawing about the conventional even harmonic mixer. Drawing 20 is drawing showing the configuration of the conventional stub part wave mixer.
[0003] As for the antiparallel diode pair which the opening stub of quarter-wave length and 2 connected diode to the short stub of quarter-wave length, and connected 3 to reverse juxtaposition on the office frequency with the office frequency (local oscillation), and 4, in drawing 20 , 1 is [a low pass filter and 5] high pass filters. Moreover, as for RF terminal and 11, 10 is [a station beginning child and 12] IF terminals.
[0004] It explains referring to a drawing about actuation of the conventional even harmonic mixer mentioned above next.
[0005] An even harmonic mixer is a mixer with which the following frequencies fi are outputted as an IF signal (a frequency is set to fi), when an office wave (a frequency is set to fp) and a RF signal (a frequency is set to fr) are inputted in the case of a down converter.
[0006] fi=fr-nfp [0007] Here, the mixer in n= 2 is explained. In the conventional stub part wave mixer shown in drawing 20 , the from office of a frequency fp is received, the short stub 2 by the side of an office beginning child is visible to disconnection, and since the opening stub 1 by the side of RF terminal is visible to a short circuit, it becomes like drawing 21 . If cautious [of diode having reverse sense mutually] and it will see from each diode, the component of a frequency fp is mutually impressed to the reverse sense. Therefore, about 2fp(s) which are the eventh harmonic content, it is in phase.
[0008] On the other hand, since the short stub 2 by the side of an office beginning child is visible to a short circuit and the opening stub 1 by the side of RF terminal is visible to disconnection about the frequency fr which hits the twice [about] of a frequency fp, it becomes like drawing 22 .
[0009] Therefore, since the component of fi=fr-2fp which is an IF signal becomes opposition mutually, a bubble is added and carried out and it can take out from the diode connected with reversed polarity. This is shown in drawing 23 . Moreover, since the component of generated 2fp(s) is opposition mutually in the RF terminal 10, it does not leak to the RF terminal 10. Furthermore, it can operate also as an up converter.
[0010] These are written to the edited by Institute of Electronics, Information and Communication Engineers "a monolithic microwave integrated circuit" and 120th page - the 122nd page.
[0011]
[Problem(s) to be Solved by the Invention] In the conventional even harmonic mixer which was mentioned above, there was a trouble that it was needed and a circuit enlarged very much two tracks which are equivalent to the half-wave length of a RF signal on a comparatively low frequency (S band and L band).
[0012] Moreover, although the property in the center frequency of a stub was good since it was a branch circuit using a stub, there was a trouble used as a narrow-band property.
[0013] Furthermore, RF frequency was [the twice / about / of an office frequency, i.e., IF frequency,] an effective mixer when very low compared with an office frequency, and when IF frequency was high, there was a problem that a property was not acquired.
[0014] It was made in order to solve the trouble mentioned above, this invention is constant-ized among the complete works of a functional circuit instead of the circuitry in a distributed constant track, and it aims at obtaining the even harmonic mixer which can broadband-ize frequency characteristics while miniaturizing.

[0015]
[Means for Solving the Problem] The even harmonic mixer concerning claim 1 of this invention Input an IF signal or a RF signal, and an office wave, and the RF signal of the sum with an office wave twice the frequency of said and said IF signal and the frequency of a difference is outputted. Or it sets to the even harmonic mixer which outputs the IF signal of the frequency of a difference twice the frequency [said RF signal and] of said office wave. The 180-degree distributor which IF terminal is connected at the middle point of an output side, and distributes said inputted office wave to opposition, The 1st low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 2nd low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 1st antiparallel diode pair which was connected to said 1st low pass filter, and connected diode to reverse juxtaposition, The 2nd antiparallel diode pair which was connected to said 2nd low pass filter, and connected diode to reverse juxtaposition, It connects at the node of said 1st and 2nd antiparallel diode pairs, and has IF short circuit which short-circuits an IF signal, and the high pass filter which is connected at the node of said 1st and 2nd antiparallel diode pairs, is made to pass a RF signal, and intercepts an office wave.

[0016] The even harmonic mixer concerning claim 2 of this invention Input an IF signal or a RF signal, and an office wave, and the RF signal of the sum with an office wave twice the frequency of said and said IF signal and the frequency of a difference is outputted. Or it sets to the even harmonic mixer which outputs the IF signal of the frequency of a difference twice the frequency [said RF signal and] of said office wave. The 180-degree distributor which the middle point of an output side connects too hastily, and distributes said inputted office wave to opposition, The 1st low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 2nd low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 1st antiparallel diode pair which was connected to said 1st low pass filter, and connected diode to reverse juxtaposition, The 2nd antiparallel diode pair which was connected to said 2nd low pass filter, and connected diode to reverse juxtaposition, The inductor which is connected between the node of said 1st and 2nd antiparallel diode pairs, and IF terminal, is made to pass an IF signal, and intercepts an office wave and a RF signal, It connects at the node of said 1st and 2nd antiparallel diode pairs, and has the high pass filter which is made to pass a RF signal and intercepts an office wave.

[0017] The even harmonic mixer concerning claim 3 of this invention is transposed to the 1st and 2nd ring diodes instead of the 1st [of claim 1], and 2nd antiparallel diode pairs.

[0018] The even harmonic mixer concerning claim 4 of this invention is transposed to the 1st and 2nd ring diodes instead of the 1st [of claim 2], and 2nd antiparallel diode pairs.

[0019] As for the even harmonic mixer concerning claim 5 of this invention, a distributor has the conversion function of an I/O impedance said 180 degrees.

[0020]
[Embodiment of the Invention] gestalt 1. of operation — it explains, referring to a drawing about the even harmonic mixer concerning the gestalt 1 of implementation of this invention. Drawing 1 is the block diagram showing the configuration of the even harmonic mixer concerning the gestalt 1 of implementation of this invention. In addition, the same sign shows the same or a considerable part among each drawing.

[0021] In drawing 1 , that to which a high pass filter (HPF) and 6 are the 180-degree distributors for a from office (local oscillation) as for an antiparallel diode pair (APDP) and 5, and 3a and 3b have a middle point terminal in an output, the low pass filter (RF short circuit form LPF) with which 7a and 7b become a short circuit to RF frequency, and 8 are IF short circuits. Moreover, as for RF terminal and 11, 10 is [a station beginning child and 12] IF terminals.

[0022] It explains referring to a drawing about actuation of the even harmonic mixer concerning the gestalt 1 of this operation next. Drawing 2 , drawing 3 , and drawing 4 are drawings showing actuation of the even harmonic mixer concerning the gestalt 1 of implementation of this invention.

[0023] The from station of a frequency fp is distributed to opposition by the distributor 6 180 degrees, and it is impressed to the antiparallel diode pairs 3a and 3b. Here, since the electrical potential difference from a station concerning two antiparallel diode pairs 3a and 3b is opposition, the node receives a from station and serves as a short circuit side (short side). This situation is shown in drawing 2 .

[0024] Next, since the RF signal of a frequency fr is short-circuited with RF short circuit form low pass filters 7a and 7b, it is impressed to two antiparallel diode pairs 3a and 3b. This situation is shown in drawing 3 .

[0025] Although RF is impressed to a distributor 6 180 degrees here when there are no RF short circuit form low pass filters 7a and 7b, the impedance to the frequency of the RF signal which is a twice [from a station / more than] as many frequency as this is strange. For this reason, the short circuit side of a RF signal becomes indefinite, and leads to increase of loss.

[0026] In order to solve this problem and to give versatility to a circuit, RF short circuit form low pass filters 7a and 7b are loaded, and it is considering as RF short circuit near the diode. This is the problem of a proper at the even harmonic mixer with which the frequency of a RF signal turns into a frequency twice [more than] the frequency relation of an office, and is because it is the frequency relation of the even harmonic mixer proper that office a frequency and RF frequency are [that insertion of these low pass filters 7a and 7b is also possible] separated.

[0027] Since it is in phase to two diodes 3a and 3b and is generated to them centering on the IF short circuit 8 as shown in drawing 4 , the IF signal of the frequency fi obtained by mixing of these two waves can be taken out from the middle point of a distributor 6 180 degrees. Moreover, like the conventional example, since the component of generated 2fp(s) is opposition mutually in the RF terminal 10, it does not leak to RF terminal. Furthermore, it can operate also as an up converter.

[0028] What transposed the block diagram of drawing 1 to the equal circuit is shown in drawing 5 . Moreover, the actual example of circuit pattern mounting is shown in drawing 6 . Each number of drawing supports each block of drawing 1 .

[0029] Without using a stub like the conventional example by applying such circuitry, all circuits can be concentrated-constant-ized and a miniaturization can be realized. Moreover, since a stub is not used, broadband-ization of a mixer is realizable by designing the frequency characteristics of a distributor 6 and LPF 7a and 7b to a broadband 180 degrees. This situation is shown in drawing 7 and drawing 8 .

[0030] Namely, the gestalt 1 of this operation inputs an IF signal or a RF signal, and an office wave. In the even harmonic mixer which outputs the RF signal of the sum with an office wave twice the frequency of said, and said IF signal, and the frequency of a difference, or outputs the IF signal of the frequency of a difference twice the frequency [said RF signal and] of said office wave The 180-degree distributor 6 for office waves which has a middle point ejection terminal in an output, and two low pass filters 7a and 7b for passing an office wave and short-circuiting a RF signal, Two antiparallel diode pairs 3a and 3b which connected diode to reverse juxtaposition, The IF short circuit 8 which short-circuits an IF signal, and the high pass filter 5 which is made to pass a RF signal and intercepts an office wave are provided. It is the balanced type even harmonic mixer short-circuited with the low pass filters 7a and 7b which made the IF terminal 12 the middle point of the 180-degree distributor 6 for office waves, and have arranged the RF signal near the diode.

[0031] gestalt 2. of operation — it explains, referring to a drawing about the even harmonic mixer concerning the gestalt 2 of implementation of this invention. Drawing 9 is the block diagram showing the configuration of the even harmonic mixer concerning the gestalt 2 of implementation of this invention.

[0032] In drawing 9 , that to which a high pass filter (HPF) and 6 are [an antiparallel diode pair (APDP) and 4] the 180-degree distributors for a from office as for a low pass filter (LPF) and 5, and 3a and 3b have a middle point terminal in an output, the low pass filter (RF short circuit form LPF) with which 7a and 7b become a short circuit to RF frequency, and 8 are IF short circuits. Moreover, as for RF terminal and 11, 10 is [a station beginning child and 12] IF terminals.

[0033] It explains referring to a drawing about actuation of the even harmonic mixer concerning the gestalt 2 of this operation next. Drawing 10 , drawing 11 , and drawing 12 are drawings showing actuation of the even harmonic mixer concerning the gestalt 2 of implementation of this invention.

[0034] The from station of a frequency fp is distributed to opposition by the distributor 6 180 degrees, and it is impressed to the antiparallel diode pairs 3a and 3b. Here, since the electrical potential difference from a station concerning two antiparallel diode pairs 3a and 3b is opposition, the node receives a from station and serves as a short circuit side (short side). This situation is shown in drawing 10 .

[0035] Next, since the RF signal of a frequency fr is short-circuited with RF short circuit form low pass filters 7a and 7b, it is impressed to two antiparallel diode pairs 3a and 3b. This situation is shown in drawing 11 .

[0036] Although RF is impressed to a distributor 6 180 degrees here when there are no RF short circuit form low pass filters 7a and 7b, the impedance to the frequency of the RF signal which is a twice [from a station / more than] as many frequency as this is strange. For this reason, the short circuit side of a RF signal becomes indefinite, and leads to increase of loss.

[0037] In order to solve this problem and to give versatility to a circuit, RF short circuit form low pass filters 7a and 7b are loaded, and it is considering as the short circuit near the diode. This is the problem of a proper at the even harmonic mixer with which the frequency of a RF signal turns into a frequency twice [more than] the frequency relation of an office, and is because it is the frequency relation of the even harmonic mixer proper that office a frequency and RF frequency are [that insertion of these low pass filters 7a and 7b is also possible] separated. It is completely the same as the gestalt 1 of the above-mentioned operation so far.

[0038] Since it is in phase to two diodes 3a and 3b and is generated to them centering on the IF short circuit 8 connected 180 degrees at the middle point of a distributor 6 as shown in drawing 12 , the IF signal of the frequency fi obtained by mixing of these two waves can be taken out from the middle point of two diodes 3a and 3b through a low pass filter 4. Moreover, like the conventional example, since the component of generated 2fp(s) is opposition mutually in the RF terminal 10, it does not leak to RF terminal. Furthermore, it can operate also as an up converter.
[0039] What transposed the block diagram of drawing 9 to the equal circuit is shown in drawing 13 . Each number of drawing supports each block of drawing 9 .
[0040] Without using a stub like the conventional example by applying such circuitry, all circuits can be concentrated-constant-ized and a miniaturization can be realized. Moreover, since a stub is not used, broadband-ization of a mixer is realizable by designing the frequency characteristics of a distributor 6 and LPF 7a and 7b to a broadband 180 degrees. This situation is shown in drawing 7 and drawing 8 .
[0041] Namely, the gestalt 2 of this operation inputs an IF signal or a RF signal, and an office wave. In the even harmonic mixer which outputs the RF signal of the sum with an office wave twice the frequency of said, and said IF signal, and the frequency of a difference, or outputs the IF signal of the frequency of a difference twice the frequency [said RF signal and] of said office wave The 180-degree distributor 6 for office waves which has a middle point ejection terminal in an output, and two low pass filters 7a and 7b for passing an office wave and short-circuiting a RF signal, Two antiparallel diode pairs 3a and 3b which connected diode to reverse juxtaposition, The IF short circuit 8 which short-circuits an IF signal, and the high pass filter 5 which is made to pass a RF signal and intercepts an office wave, The inductor (LPF) 4 which is made to pass an IF signal and intercepts an office wave and a RF signal is provided. Consider the middle point of the 180-degree distributor 6 for office waves as a short circuit, and it considers as the point through the inductor to which the IF terminal 12 was connected at the middle point of two antiparallel diode pairs 3a and 3b. It is the balanced type even harmonic mixer short-circuited with the low pass filters 7a and 7b which have arranged the RF signal near the diode.
[0042] gestalt 3. of operation — it explains, referring to a drawing about the even harmonic mixer concerning the gestalt 3 of implementation of this invention. Drawing 14 is the block diagram showing the configuration of the even harmonic mixer concerning the gestalt 3 of implementation of this invention.
[0043] In drawing 14 , it transposes to the ring diodes (Ring Diode) 9a and 9b instead of the antiparallel diode pairs (APDP) 3a and 3b of drawing 1 shown with the gestalt 1 of the above-mentioned implementation. Other configurations are completely the same.
[0044] Next, actuation of the gestalt 3 of this operation is explained. The ring diodes 9a and 9b can be considered that the antiparallel diode pair shown with the gestalt 1 of the above-mentioned implementation was connected to the serial, and are the same principles of operation as the gestalt 1 of the above-mentioned implementation.
[0045] What transposed the block diagram of drawing 14 to the equal circuit is shown in drawing 15 . Each number of drawing supports each block of drawing 14 .
[0046] Without using a stub like the conventional example by applying such circuitry, all circuits can be concentrated-constant-ized and a miniaturization can be realized. Moreover, since a stub is not used, broadband-ization of a mixer is realizable by designing LPF 7a and 7b and the frequency characteristics of the 180-degree distributor 6 to a broadband. Furthermore, it becomes possible to heighten the saturation power of diode by using the ring diodes 9a and 9b by which diode was connected to the serial.
[0047] That is, the gestalt 3 of this operation is the balanced type even harmonic mixer which transposed the antiparallel diode pairs 3a and 3b of the gestalt 1 of the above-mentioned implementation to the ring diodes 9a and 9b.
[0048] gestalt 4. of operation — it explains, referring to a drawing about the even harmonic mixer concerning the gestalt 4 of implementation of this invention. Drawing 16 is the block diagram showing the configuration of the even harmonic mixer concerning the gestalt 4 of implementation of this invention.
[0049] In drawing 16 , the antiparallel diode pairs (APDP) 3a and 3B of drawing 9 shown with the gestalt 2 of the above-mentioned implementation are transposed to the ring diodes (Ring Diode) 9a and 9b. Other configurations are completely the same.
[0050] Next, actuation of the gestalt 4 of this operation is explained. The ring diodes 9a and 9b can be considered that the antiparallel diode pair shown with the gestalt 2 of the above-mentioned implementation was connected to the serial, and are the same principles of operation as the gestalt 2 of the above-mentioned implementation.
[0051] What transposed the block diagram of drawing 16 to the equal circuit is shown in drawing 17 . Each

number of drawing supports each block of drawing 16 .

[0052] Without using a stub like the conventional example by applying such circuitry, all circuits can be concentrated-constant-ized and a miniaturization can be realized. Moreover, since a stub is not used, broadband-ization of a mixer is realizable by designing LPF 7a and 7b and the frequency characteristics of the 180-degree distributor 6 to a broadband. Furthermore, it becomes possible to heighten the saturation power of diode by using the ring diode by which diode was connected to the serial.

[0053] That is, the gestalt 4 of this operation is the balanced type even harmonic mixer which transposed the antiparallel diode pairs 3a and 3b of the gestalt 2 of the above-mentioned implementation to the ring diodes 9a and 9b.

[0054] gestalt 5. of operation — it explains, referring to a drawing about the even harmonic mixer concerning the gestalt 5 of implementation of this invention. Drawing 18 is the block diagram showing the configuration of the even harmonic mixer concerning the gestalt 5 of implementation of this invention.

[0055] In drawing 18 , it transposes to the 180-degree distributor 20 which has an impedance conversion function instead of drawing 1 shown with the gestalten 1-4 of the above-mentioned implementation, drawing 9 , drawing 14 , and the 180-degree distributor 6 of drawing 16 . Other configurations and actuation are completely the same.

[0056] What transposed the block diagram of drawing 18 to the equal circuit is shown in drawing 19 . Each number of drawing supports each block of drawing 18 .

[0057] Without using a stub like the conventional example by applying such circuitry, all circuits can be concentrated-constant-ized and a miniaturization can be realized. Moreover, since a stub is not used, broadband-ization of a mixer is realizable by designing LPF 7a and 7b and the frequency characteristics of the 180-degree distributor 20 to a broadband. Furthermore, by changing into a desired impedance with a distributor 20 180 degrees, the electrical potential difference which can realize office impedance matching and is built over a diode edge can be raised, and the increase in efficiency of the office generation-of-electrical-energy force can be attained.

[0058] That is, the gestalt 5 of this operation is the balanced type even harmonic mixer which applied the configuration to the gestalt 4 of operation from the gestalt 1 of the above-mentioned implementation, and transposed the 180-degree distributor 6 for a from station to the 180-degree distributor 20 which has the conversion function of an I/O impedance.

[0059] In addition, the mixer of a configuration of having been indicated by either of the gestalten 1-5 of the above-mentioned implementation may be used for a transmitter-receiver. The miniaturization of a transmitter-receiver and broadband-ization are attained by using this mixer.

[0060] Moreover, the mixer of a configuration of having been indicated by either of the gestalten 1-5 of the above-mentioned implementation may be used for a communication device and a radar installation. By using this configuration, the miniaturization of a communication device and a radar installation and broadband-ization are attained.

[0061]

[Effect of the Invention] The even harmonic mixer concerning claim 1 of this invention An IF signal or a RF signal, and an office wave are inputted as explained above. In the even harmonic mixer which outputs the RF signal of the sum with an office wave twice the frequency of said, and said IF signal, and the frequency of a difference, or outputs the IF signal of the frequency of a difference twice the frequency [said RF signal and] of said office wave The 180-degree distributor which IF terminal is connected at the middle point of an output side, and distributes said inputted office wave to opposition, The 1st low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 2nd low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 1st antiparallel diode pair which was connected to said 1st low pass filter, and connected diode to reverse juxtaposition, The 2nd antiparallel diode pair which was connected to said 2nd low pass filter, and connected diode to reverse juxtaposition, IF short circuit which it connects [short circuit] at the node of said 1st and 2nd antiparallel diode pairs, and short-circuits an IF signal, Since it had the high pass filter which is connected at the node of said 1st and 2nd antiparallel diode pairs, is made to pass a RF signal, and intercepts an office wave, while being able to miniaturize, the effectiveness that frequency characteristics can be broadband-ized is done so.

[0062] The even harmonic mixer concerning claim 2 of this invention An IF signal or a RF signal, and an office wave are inputted as explained above. In the even harmonic mixer which outputs the RF signal of the sum with an office wave twice the frequency of said, and said IF signal, and the frequency of a difference, or outputs the IF signal of the frequency of a difference twice the frequency [said RF signal and] of said office wave The 180-

degree distributor which the middle point of an output side connects too hastily, and distributes said inputted office wave to opposition, The 1st low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 2nd low pass filter which is connected to a distributor said 180 degrees, is made to pass said office wave, and short-circuits a RF signal, The 1st antiparallel diode pair which was connected to said 1st low pass filter, and connected diode to reverse juxtaposition, The 2nd antiparallel diode pair which was connected to said 2nd low pass filter, and connected diode to reverse juxtaposition, The inductor which is connected between the node of said 1st and 2nd antiparallel diode pairs, and IF terminal, is made to pass an IF signal, and intercepts an office wave and a RF signal, Since it had the high pass filter which is connected at the node of said 1st and 2nd antiparallel diode pairs, is made to pass a RF signal, and intercepts an office wave, while being able to miniaturize, the effectiveness that frequency characteristics can be broadband-ized is done so.

[0063] Since the even harmonic mixer concerning claim 3 of this invention was transposed to the 1st and 2nd ring diodes instead of the 1st [of claim 1], and 2nd antiparallel diode pairs as it was explained above, it does so the effectiveness that the saturation power of diode can be heightened.

[0064] Since the even harmonic mixer concerning claim 4 of this invention was transposed to the 1st and 2nd ring diodes instead of the 1st [of claim 2], and 2nd antiparallel diode pairs as it was explained above, it does so the effectiveness that the saturation power of diode can be heightened.

[0065] Since a distributor has the conversion function of an I/O impedance said 180 degrees as explained above, the even harmonic mixer concerning claim 5 of this invention can raise the electrical potential difference which can realize office impedance matching and is built over a diode edge, and does so the effectiveness that the increase in efficiency of the office generation-of-electrical-energy force can be attained.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the configuration of the even harmonic mixer concerning the gestalt 1 of implementation of this invention.
[Drawing 2] It is drawing showing actuation of the even harmonic mixer concerning the gestalt 1 of implementation of this invention.
[Drawing 3] It is drawing showing actuation of the even harmonic mixer concerning the gestalt 1 of implementation of this invention.
[Drawing 4] It is drawing showing actuation of the even harmonic mixer concerning the gestalt 1 of implementation of this invention.
[Drawing 5] It is drawing showing the equal circuit configuration of the even harmonic mixer concerning the gestalt 1 of implementation of this invention.
[Drawing 6] It is drawing showing the example of mounting of the even harmonic mixer concerning the gestalt 1 of implementation of this invention.
[Drawing 7] It is drawing showing the frequency characteristics of the even harmonic mixer concerning the gestalt 1 of implementation of this invention.
[Drawing 8] It is drawing showing the frequency characteristics of the even harmonic mixer concerning the gestalt 1 of implementation of this invention.
[Drawing 9] It is the block diagram showing the configuration of the even harmonic mixer concerning the gestalt 2 of implementation of this invention.
[Drawing 10] It is drawing showing actuation of the even harmonic mixer concerning the gestalt 2 of implementation of this invention.
[Drawing 11] It is drawing showing actuation of the even harmonic mixer concerning the gestalt 2 of implementation of this invention.
[Drawing 12] It is drawing showing actuation of the even harmonic mixer concerning the gestalt 2 of implementation of this invention.
[Drawing 13] It is drawing showing the equal circuit configuration of the even harmonic mixer concerning the gestalt 2 of implementation of this invention.
[Drawing 14] It is the block diagram showing the configuration of the even harmonic mixer concerning the gestalt 3 of implementation of this invention.
[Drawing 15] It is drawing showing the equal circuit configuration of the even harmonic mixer concerning the gestalt 3 of implementation of this invention.
[Drawing 16] It is the block diagram showing the configuration of the even harmonic mixer concerning the gestalt 4 of implementation of this invention.
[Drawing 17] It is drawing showing the equal circuit configuration of the even harmonic mixer concerning the gestalt 4 of implementation of this invention.
[Drawing 18] It is the block diagram showing the configuration of the even harmonic mixer concerning the gestalt 5 of implementation of this invention.
[Drawing 19] It is drawing showing the equal circuit configuration of the even harmonic mixer concerning the gestalt 5 of implementation of this invention.
[Drawing 20] It is drawing showing the configuration of the conventional even harmonic mixer.
[Drawing 21] It is drawing showing actuation of the conventional even harmonic mixer.
[Drawing 22] It is drawing showing actuation of the conventional even harmonic mixer.
[Drawing 23] It is drawing showing actuation of the conventional even harmonic mixer.
[Description of Notations]

3a, 3b An antiparallel diode pair (APDP), 4 A low pass filter (LPF), 5 A high pass filter (HPF), 6 180-degree distributor, 7a, 7b A low pass filter (RF short circuit form LPF), 8 IF short circuit, 9a, 9b Ring diode (Ring Diode), 10 RF terminal, 11 A station beginning child, 12IF terminal, 20 180-degree distributor.

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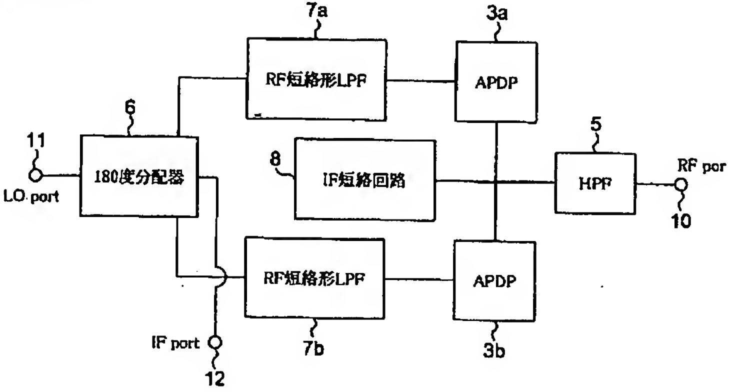
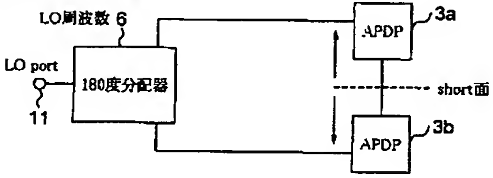
DRAWINGS

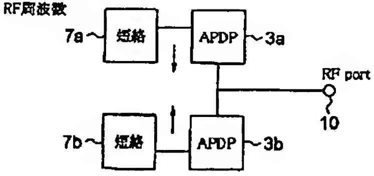
[Drawing 1]


7a
3a
RF短絡形LPF
APDP
6
11
5
8
180度分配器
IF短絡回路
HPF
RF por
LO port
10
RF短絡形LPF
APDP
IF port
7b
3b
12

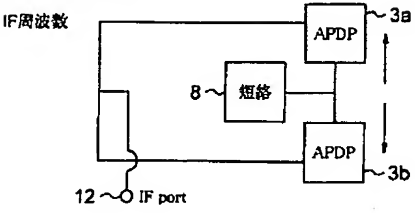
[Drawing 2]


LO周波数 6
APDP
3a
LO port
180度分配器
short面
11
3b
APDP

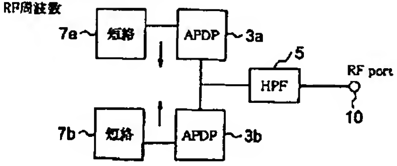
[Drawing 3]


RF周波数
7a
短絡
APDP
3a
RF port
10
7b
短絡
APDP
3b

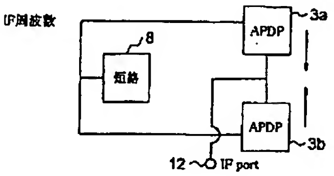
[Drawing 4]


IF周波数
APDP
3a
8
短絡
APDP
3b
12
IF port

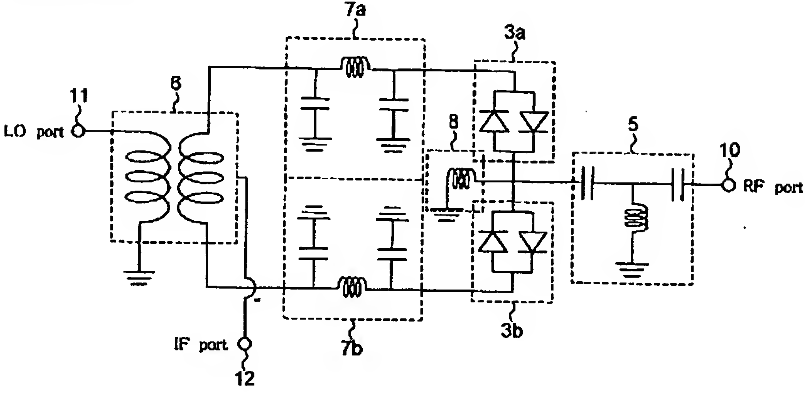
[Drawing 11]


RF周波数
7a
短絡
APDP
3a
5
HPF
RF port
10
7b
短絡
APDP
3b

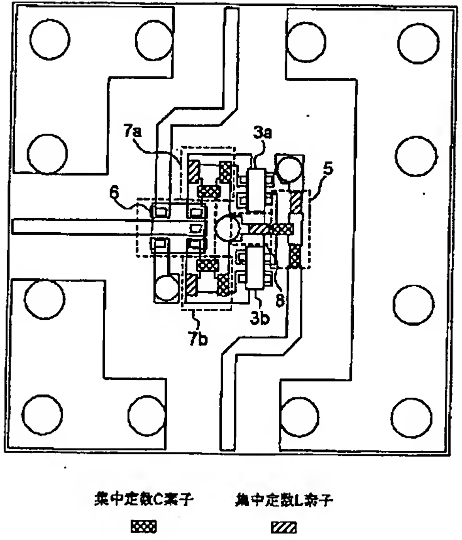
[Drawing 12]


IF周波数
8
短絡
APDP
3a
APDP
3b
12
IF port

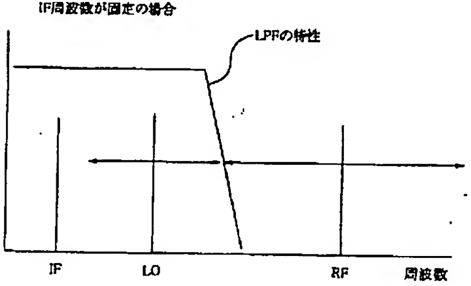
[Drawing 5]


7a
3a
11
LO port
6
8
5
10
RF port
IF port
12
7b
3b

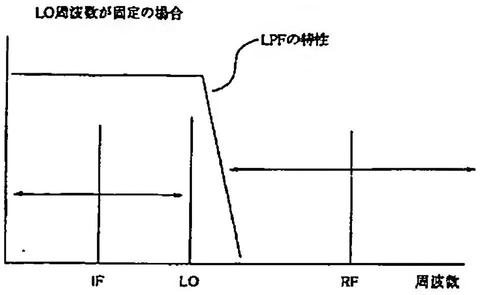
[Drawing 6]


7a
3a
6
5
7b
3b
8
集中定数C素子 ▩
集中定数L素子 ▨

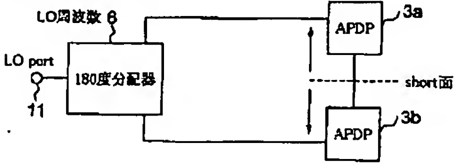
[Drawing 7]



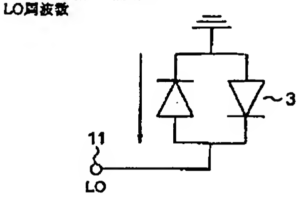
[Drawing 8]



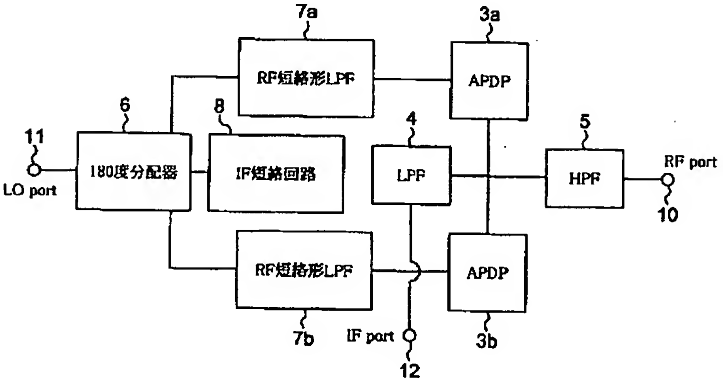
[Drawing 10]


LO周波数 6
LO port
11
180度分配器
APDP
3a
short面
APDP
3b

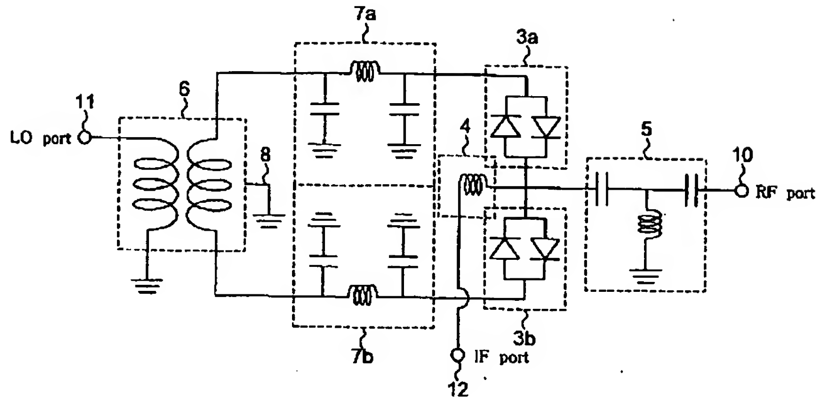
[Drawing 21]


LO周波数
~3
11
LO

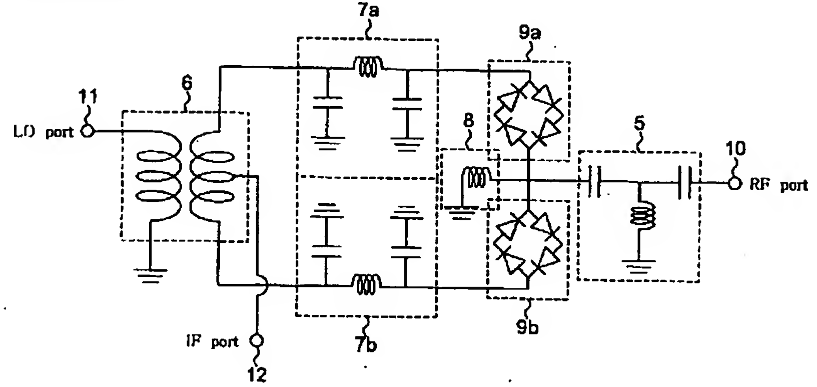
[Drawing 9]


7a
RF短絡形LPF
3a
APDP
6
8
11
LO port
180度分配器
IF短絡回路
4
LPF
5
HPF
RF port
10
RF短絡形LPF
APDP
7b
IF port
12
3b

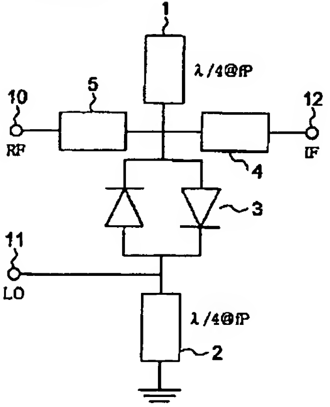
[Drawing 13]


7a
3a
11
6
LO port
8
4
5
10
RF port
3b
7b
IF port
12

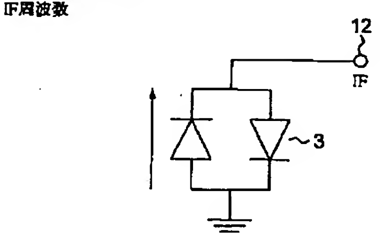
[Drawing 15]


7a
9a
11
6
LO port
8
5
10
RF port
9b
IF port
7b
12

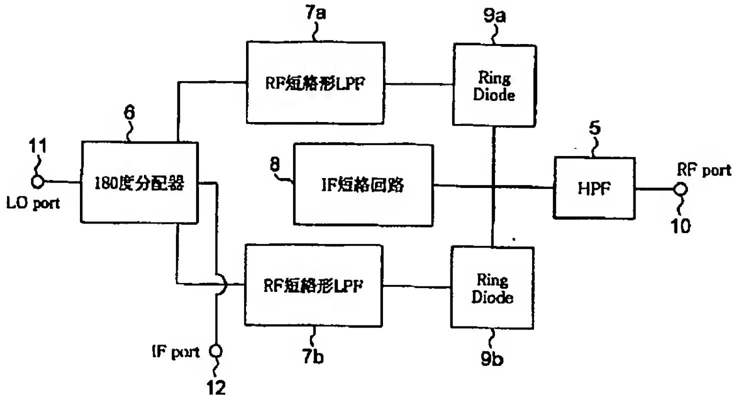
[Drawing 20]


1
λ/4@fP
10
5
12
RF
IF
4
3
11
LO
λ/4@fP
2

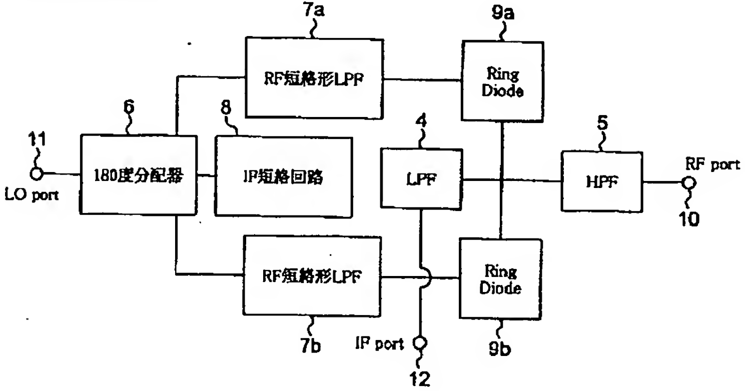
[Drawing 23]


IF周波数
12
IF
3

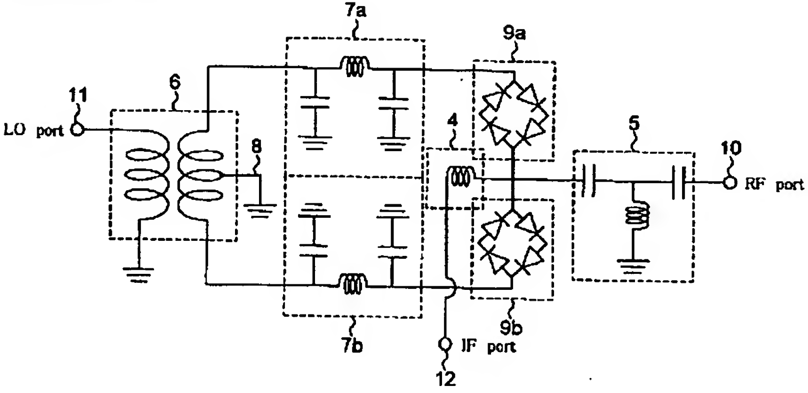
[Drawing 14]


7a
9a
RF短絡形LPF
Ring Diode
6
11
5
180度分配器
8
IF短絡回路
HPF
RF port
LO port
10
RF短絡形LPF
Ring Diode
IF port
12
7b
9b

[Drawing 16]

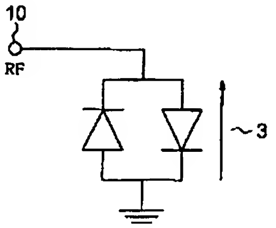

7a
9a
RF短絡形LPF
Ring Diode
6
8
4
5
11
180度分配器
IF短絡回路
LPF
HPF
RF port
LO port
10
RF短絡形LPF
Ring Diode
7b
IF port
9b
12

[Drawing 17]

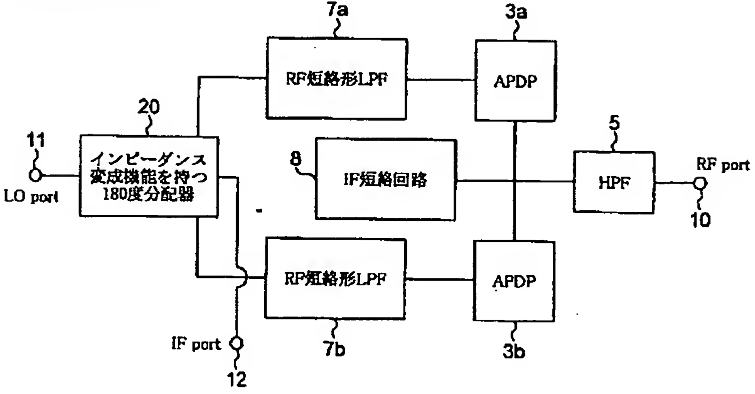

7a
9a
6
11
LO port
8
4
5
10
RF port
9b
7b
IF port
12

[Drawing 22]

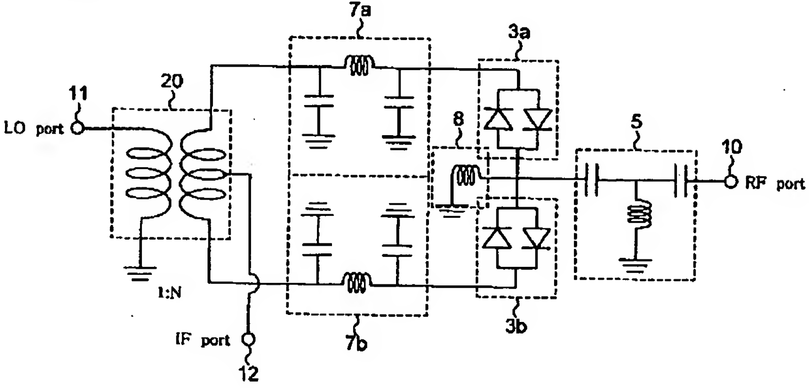
RF周波数



[Drawing 18]


7a
3a
RF短絡形LPF
APDP
20
5
11
インピーダンス変成機能を持つ180度分配器
8
IF短絡回路
HPF
RF port
LO port
10
RF短絡形LPF
APDP
IF port
7b
3b
12

[Drawing 19]


7a
3a
11
20
8
5
LO port
10
RF port
1:N
IF port
7b
3b
12

[Translation done.]